WHITE PAPER

Deliver Your Digital Workspace with a New Approach to End-User Computing

Transform EUC with VDI solutions powered by NetApp HCI

NetApp®

Table of Contents

End-User Computing Requires a New Approach to Infrastructure

Digital transformation has changed the mechanisms of how data is processed, moved, and consumed. This transformation has a profound effect on the workers in your company as business expectations change. Increased mobility and cross-functional collaboration have created the need to untether the digital workspace so that your users can access applications and data anywhere, on any device.

Supporting today's end-user computing (EUC) environments can mean that you have to navigate multiple cloud providers and deliver high-performance applications from your data center. Even if you're extremely careful, the result is often the proliferation of independent, purpose-built silos of infrastructure that are not integrated with your existing data platforms.

Virtual desktop infrastructure (VDI) environments are under the most pressure. As display technology advances toward 4K, 8K, and even 16K resolution, applications are evolving to support graphically intensive workloads. These workloads create unprecedented demand for fast, consistent performance. To isolate failure domains, VDI typically uses a pod-based architecture that siloes VDI from other workloads. But this approach ignores applications and might not deliver the end-user experience that you want. To meet service expectations, you must accelerate applications and databases in parallel with virtual desktops.

Taking a new approach to EUC and to VDI that enables automation, predictability, and integrations is critical. With the right infrastructure in place, IT leaders like you can create tomorrow's EUC environment today—with more apps, more users, and more desktops—while also guaranteeing performance for mission-critical users.

NetApp HCI Simplifies EUC

Run virtual desktops and important user applications on the same infrastructure

The NetApp® HCI enterprise-scale hybrid cloud infrastructure solution simplifies and accelerates EUC and VDI deployments. Because virtual desktops and important user applications run on the same NetApp HCI infrastructure, a complete EUC environment is faster to design and to deploy, and it's easier for you to manage and to scale.

NetApp HCI integrates flexible compute options and proven all-flash storage in a turnkey scale-out solution that's simple to manage and easy to automate. This approach enables your EUC environment to expand with no disruptions and no costly surprises. The end-user experience is protected with guaranteed performance, avoiding the painful slowdowns that are common with conventional infrastructure.

NetApp HCI helps you overcome both the business and the technical challenges of EUC, with an innovative infrastructure that is:

- **Automated** to deliver operational simplicity and efficiency
- **Predictable** to provide resources where and when you need them
- **Integrated** to enable your data to move freely
- **Protected** to keep data within your data center regardless of where it's accessed

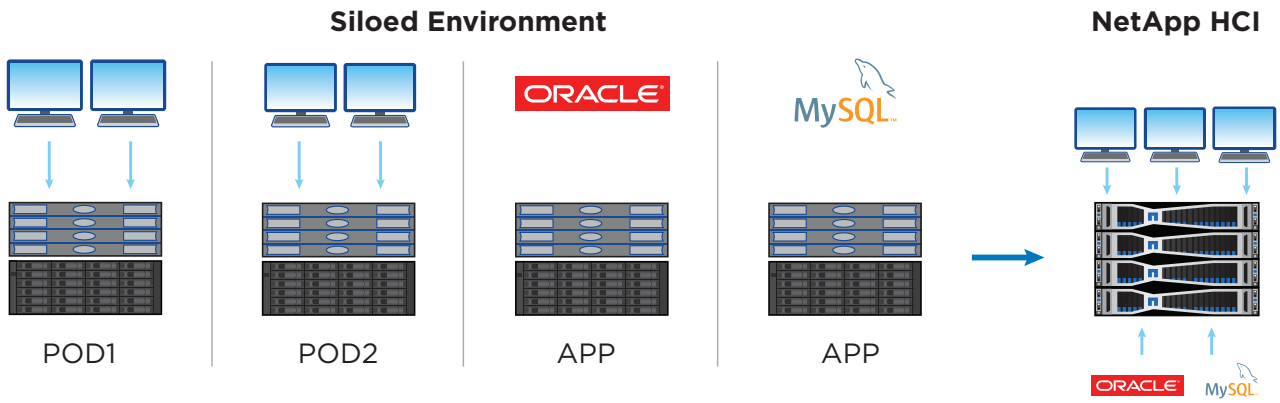

Figure 1) With NetApp HCI, you can consolidate your siloed VDI and application environments on a single infrastructure with guaranteed performance and simple management.

Operational Simplicity and Efficiency

Take the pain out of managing, scaling, and automating EUC

By moving your workloads that are running on high-end workstations back to your centralized data center, NetApp HCI helps your company reduce costs and improve end-user service. NetApp HCI uses industry-leading VDI, virtual machines (VMs), and hypervisors to present high-end graphics remotely in real time. NetApp HCI provides:

- **Ability to scale compute and storage independently.** By enabling you to add compute and storage independently, NetApp HCI helps you avoid the scaling challenges of other hybrid cloud infrastructure solutions. If compute is the limiting factor for your system, you can simply add more compute nodes. If you need more storage capacity or performance, simply add storage nodes. New storage nodes integrate seamlessly, so to scale your environment, you don't need to rip and replace your infrastructure that's already in place. You aren't forced to add compute resources when you need only more storage, and you don't have to add storage resources when all you need is more compute. And when the VDI day ends, the GPUs can be repurposed for compute-intensive post-processing like modeling or rendering.

  NetApp HCI can absorb multiple concurrent faults without affecting your application performance. Recovering from a drive or node failure takes only minutes and is fully automatic. You don't need operator intervention to restore redundancy, and you eliminate the fire drills that typically occur when a component fails.

- **Instant familiarity.** NetApp HCI is fully compatible with leading VDI solutions and capable of supporting these example EUC applications:

VDI	EUC
• VMWare Horizon 7 • Citrix Virtual Apps/ Virtual Desktop (XenApp/ XenDesktop)	• VMware Workspace ONE • Citrix Workspace • Microsoft Windows Virtual Desktop • CloudJumper Workspace

- **100% programmability.** Automation is essential to your success in the digital era. With NetApp HCI, you can rapidly deploy applications and services to meet your business needs. REST-based APIs and deep integration with management and orchestration platforms help NetApp HCI interoperate with every component in your environment (Figure 2). You can use popular automation tools and simplify management as you scale your EUC environment to support new users and applications.

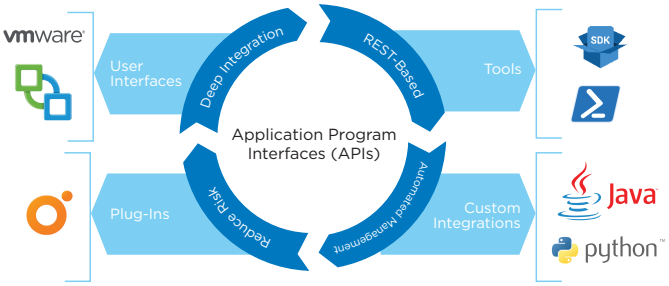

Figure 2) NetApp HCI offers compatibility and programmability to increase the efficiency and simplicity of your operations.

Predictable Performance Delivery

Get guaranteed performance for the most demanding EUC environments

In EUC environments, the predictability of performance is critical for you to maintain end-user satisfaction. However, spikes in your user activity can be hard to predict. With traditional approaches to storage infrastructure, this unpredictability leads to inevitable slowdowns and user complaints.

Virtual desktop environments are also well known for predictable spikes in activity. For example, hundreds of your users often log in at about the same time each day creating a boot storm. Because of the large number of users, this situation can create a spike in your storage I/O that is difficult to design for by using conventional approaches.

By guaranteeing a minimum level of storage performance for each volume, NetApp HCI eliminates these problems. Your user desktops and applications deliver predictable performance, even in the face of big spikes in total user activity, which increases satisfaction and helps eliminate complaints. The innovative architecture of NetApp HCI prevents noisy neighbors and runaway processes from interfering with other users.

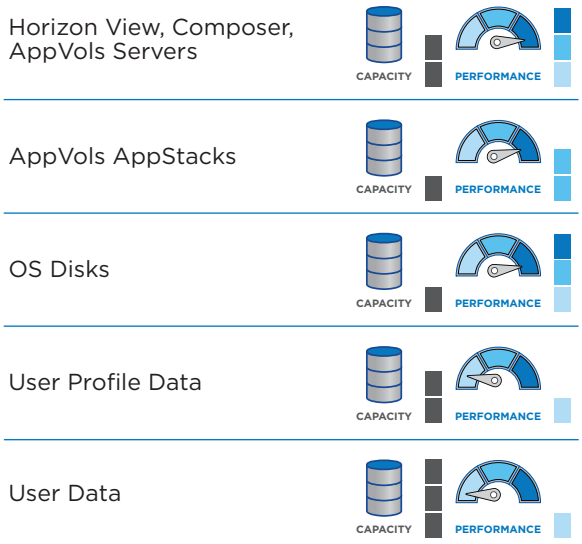

Figure 3) NetApp HCI allocates capacity and performance independently using quality of service.

NetApp HCI manages performance automatically and gives you the tools to resolve any performance problems instantaneously. You get:

- **Discrete storage performance for each application.** With traditional storage infrastructure, the penalty for getting capacity and performance allocations wrong is complicated and time-consuming data migration or even rearchitecting. Because you can allocate storage capacity and compute performance independently for every virtual desktop and application (Figure 3), NetApp HCI is optimal for EUC environments. You can also easily adjust allocations as your workloads shift or as your needs evolve.
- **Automated data distribution and load balancing.** To guarantee performance, NetApp HCI balances pools of performance and capacity across the hybrid cloud infrastructure cluster. Resources are provisioned to meet the needs of each volume or virtual disk, with performance defined in terms of minimum, maximum, and burst characteristics. Changes to these performance and capacity policies take effect immediately, without the need to move your data to different storage.
- **Ability to resolve performance problems instantly.** When you provision a new storage volume for a user or an application, it can be difficult to know with certainty how much performance you are going to need. If you later need more performance, the initial configuration can become a bottleneck. NetApp HCI eliminates the penalty for underestimation of requirements. You simply modify quality-of-service policies to change the settings for minimum, maximum, and burst, and the new settings take effect immediately. You can define different service classes for users of your EUC environment and can easily "promote" a user to a higher class of service.

Data Fabric Integration

Confirm that your EUC environment isn't siloed from the rest of your operations

An EUC environment must integrate easily with your IT operations, both on the premises and in the cloud. Otherwise, it becomes another infrastructure silo, making your data center more complex. In a next-generation data center, you must be able to manage and to protect data globally and to integrate with other important applications and services in your data center environment and beyond.

NetApp partners with leading cloud vendors to deliver true hybrid multicloud EUC. Currently, NetApp supports VMware Workspace ONE, Citrix Workspace, Microsoft Azure Windows Virtual Desktop, and CloudJumper Cloud Workspace.

VMware Workspace ONE

Workspace ONE integrates access control, application management, and multiplatform endpoint management into a single platform and is available as a cloud service or as on-premises deployment on NetApp HCI.

Citrix Workspace

Citrix Workspace offers an intelligent workspace with LAN-speed graphics. It can run on Google Cloud, AWS, Azure, or any public cloud. You can run Citrix Workspace on the premises with NetApp HCI and with Citrix Cloud Connector.

Microsoft Azure Windows Virtual Desktop

Windows Virtual Desktop is a comprehensive desktop and app virtualization service that runs on Azure and offers the only multisession Windows 10 virtual desktop experience.

CloudJumper Cloud Workspace on Hybrid Cloud

CloudJumper enables you to run hybrid cloud Windows Virtual Desktop sessions on Azure, AWS, or Google Cloud or on the premises with NetApp HCI.

Knowing that your choice of cloud providers might change over time, NetApp helps protect the integrity of your data fabric with a range of hybrid cloud data services. Azure NetApp Files, for example, enables users to run CloudJumper and desktops in Azure and to seamlessly migrate on-premises to NetApp HCI by using NetApp Cloud Volumes Service.

Meet the Needs of All End Users with NetApp HCI

A smarter approach to hybrid cloud infrastructure for your EUC and other enterprise needs

NetApp has partnered with NVIDIA and VMware to create VDI solutions for task workers, knowledge workers, and 3D graphics power users. Figure 4 shows how NetApp HCI, NVIDIA GPUs, and VMware Horizon interoperate to meet the needs of all your end users.

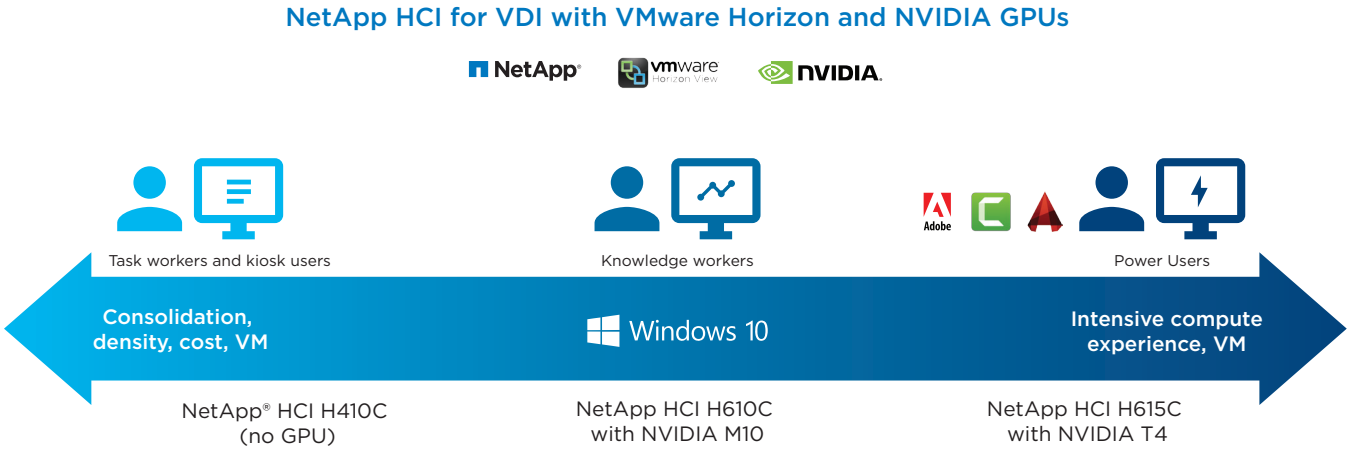

Figure 4) NetApp HCI, NVIDIA GPUs, and VMware Horizon work together to meet the needs of any end user.

MODEL	H410C	H610C	H615C
Optimal for	Task workers and kiosk users	Knowledge workers and Windows Virtual Desktop	Power users and 3D VDI
CPU	• 2 x Intel Xeon Gold 5122, 4 cores, 3.6GHz • 2 x Intel Xeon Silver 4110, 8 cores, 2.1GHz • 2 x Intel Xeon Gold 5120, 14 cores, 2.2GHz • 2 x Intel Xeon Gold 6138, 20 cores, 2.0GHz	• 2 x Intel Xeon Gold 6130, 16 cores, 2.1GHz	• 2 x Intel Silver 4214, 12 cores, 2.2GHz • 2 x Intel Gold 5222, 4 cores, 3.8GHz • 2 x Intel Gold 6242, 16 cores, 2.8GHz • 2 x Intel Gold 6252, 24 cores, 2.1GHz • 2 x Intel Gold 6240Y Speed Select; • 18, 14, 8 cores; • 2.6, 2.8, 3.1GHz
GPU		• 2 x NVIDIA Tesla M10 GPU cards	• 3 x NVIDIA Tesla T4 GPU cards
Memory	384GB–1TB	512GB	384GB–1.5TB

Table 1) NetApp HCI offers three compute nodes to meet your needs.

Use of the right software is an integral component of transforming an EUC experience. NetApp HCI works with several software implementations, including Citrix HDX 3D Pro, VMware View Blast, and Mechdyne TGX.

Citrix HDX 3D Pro

Citrix HDX 3D Pro runs with VMware vSphere and Citrix XenServer hypervisors. It supports two-user collaboration and offers LAN-speed graphics.

VMware View Blast

VMware View Blast runs with H.264 codecs for 4K through HTML5 codecs (with Horizon View Shop) and supports one 4K monitor with LAN speed. It runs only by using the vSphere hypervisor and is suitable for light to medium graphics.

Mechdyne TGX

Mechdyne TDX offers a high-end graphics protocol for power users, such as in the oil and gas industry and in the healthcare industry. It supports up to four 4K monitors that use WAN and LAN speed. It works with vSphere, XenServer, and Red Hat Kernel-Based Virtual Machine (KVM) hypervisors.

Planning Your EUC Future

Today's EUC infrastructures can't keep pace with digital workplace transformation and user expectations for fast, consistent performance. More endpoints, more users, and graphic-intensive applications slow performance and frustrate users. It's time for a new approach to EUC and VDI.

NetApp HCI gives you benefits that other hybrid cloud infrastructure solutions simply can't match. With this enterprise-scale hybrid cloud infrastructure solution, you get predictable performance on a highly flexible, efficient architecture that is simple to deploy and to manage. With our HCI GPU nodes, you can run virtual desktops and other user applications side by side with guaranteed performance. NetApp HCI enables you to meet the rapidly changing needs of your end users and your business so that you can focus on what matters most: growing your business.

Learn More

IIf you're ready to create tomorrow's EUC environment, NetApp is ready to help you. To learn more about NetApp HCI, review the following resources.

NetApp HCI H410C

- VMware End-User Computing with NetApp HCI (NetApp Verified Architecture Design)
- NetApp HCI for End-User Computing with VMware (NetApp Verified Architecture Deployment)

NetApp HCI H610C

- VMware End-User Computing with NetApp HCI and NVIDIA GPUs (NetApp Verified Architecture Design)
- NetApp HCI for End-User Computing with VMware and NVIDIA GPUs (NetApp Verified Architecture Deployment)

NetApp HCI H615C

- NetApp HCI for Virtual Desktop Infrastructure with VMware Horizon View
- NetApp HCI for Citrix (NetApp Verified Architecture Design)

Refer to the Interoperability Matrix Tool (IMT) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

NA-299-1019

NetApp®